NETWORK TYPES AND SIGNIFICANCE

KANWAR PAL

Abstract :- Data communications and networking may be the fastest growing technologies in our culture today. One of the ramifications of that growth is a dramatic increase in the number of professions where an understanding of these technologies is essential for success—and a proportionate increase in the number and types of students taking courses to learn about them. Today, students wanting to understand the concepts and mechanisms underlying telecommunications and networking come from a variety of academic and professional backgrounds. To be useful, a textbook on data communications and networking must be accessible to students without technical backgrounds while still providing substance comprehensive enough to challenge more experienced readers. This text was written with this new mix of students in mind. In this paper, we introduce the need for studying data communications and networking and we discuss those concepts.

Keywords :- Topologies,Network, technology,microcomputers,logically,workstation.

Introduction:-

NETWORKS

A network is a set of devices (often referred to as nodes) connected by media links. A node can be a computer, printer, or any other device capable of sending and/or receiving data generated by other nodes on the network. The links connecting the devices are often called communication channels.

TOPOLOGY

The term topology refers to the way a network is laid out, either physically or logically. Two or more devices connect to a link; two or more links form a topology. The topology of a network is the geometric representation of the relationship of all the links and linking devices (usually called nodes) to each other. There are five basic topologies possible: mesh star, tree, bus, and ring .For example, having a star topology does not mean that all of the computers in the network must be placed physically around a hub in a star shape. A consideration when choosing a topology is the relative status of the devices to be linked. Two relationships are possible: peer-to-peer, where the devices share the link equally, and primary-secondary, where one device controls traffic and the others must transmit through it. Ring and mesh topologies are more convenient for peer-to peer transmission, while star and tree are more convenient for primary-secondary. A bus topology is equally convenient for either.

Mesh

In a mesh topology, every device has a dedicated point-to-point link to every other device. The term dedicated means that the link carries traffic only between the two devices it connects. A fully connected mesh network therefore has n(n-1)/2 physical channels to link n devices. To accommodate that many links, every device on the net work must have n-1 input/output (IO) ports (see Figure).

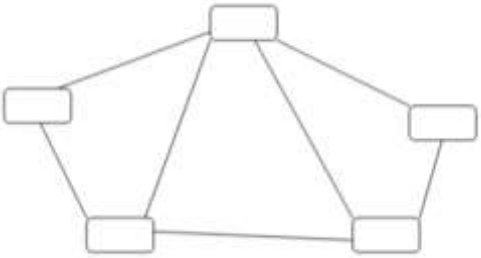


Figure -Fully connected mesh topology (for five devices)

A mesh offers several advantages over other network topologies. First, the use of dedicated links guarantees that cach connection can carry its own data load, thus eliminating the traffic problems that can occur when links must be shared by multiple devices. Second, a mesh topology is robust. If one link becomes unusable, it does not incapacitate the entire system.

Star

In a star topology, each device has a dedicated point-to-point link only to a central controller, usually called a hub. The devices are not directly linked to each other. Unlike a mesh topology, a star topology does not allow direct traffic between devices. The controller acts as an exchange: If one device wants to send data to another, it sends the data to the controller, which then relays the data to the other connected device (see Figure).

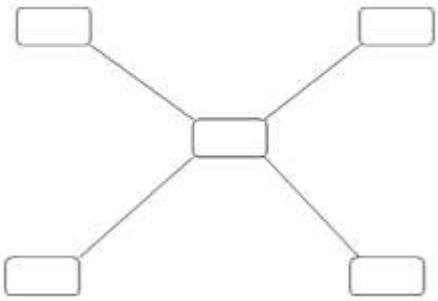


Figure Star topology

A star topology is less expensive than a mesh topology. In a star, each device needs only one link and one I/O port to connect it to any number of others. This factor also makes it easy to install and reconfigure. Far less cabling needs to be housed, and additions, moves, and deletions involve only one connection: between that device and the hub.

Tree

A tree topology is a variation of a star. As in a star, nodes in a tree are linked to a central hub that controls the traffic to the network. However, not every device plugs directly into the central hub. The majority of devices connect to a secondary hub that in turn is connected to the central hub (see Figure). The central hub in the tree is an active hub. An active hub contains a repeater, which is a hardware device that regenerates the received bit patterns before sending
them out . Repeating strengthens trans missions and increases the distance a signal can travel.

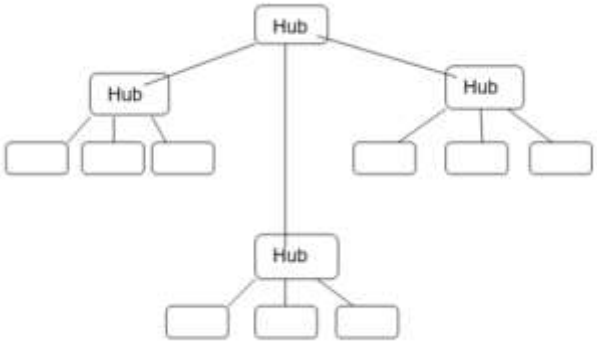


Figure -Tree topology

Bus

The preceding examples all describe point-to-point configurations. A bus topology, on the other hand, is multipoint. One long cable acts as a backbone to link all the devices in the network (see Figure .Nodes are connected to the bus cable by drop lines and taps. A drop line is a connection running between the device and the main cable. A tap is a connector that either splices into the main cable or punctures the sheathing of a cable to create a contact with the metallic core. As a signal travels along the backbone, some of its energy is transformed into heat. Therefore, it becomes weaker and weaker the farther it has to travel. For this reason there is a limit on the number of taps a bus can support and on the distance between those taps. Advantages of a bus topology include ease of installation. Backbone cable can be Jaid along the most efficient path, then connected to the nodes by drop lines of various lengths. In this way, a bus uses less cabling than mesh, star, or tree topologies. In a star.

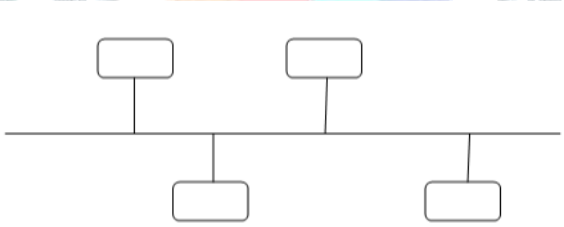
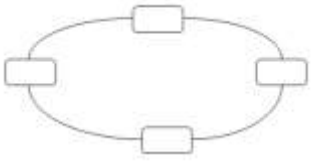


Figure -Bus topology

Ring

In a ring topology, each device has a dedicated point-to-point line configuration only with the two devices on either side of it. A signal is passed along the ring in one direction, from device to device, until it reaches its destination. Each device in the ring incorporates a repeater. When a device receives a signal intended for another device, its repeater regenerates the bits and passes them along (see Figure)



Ring Topology

Hybrid Topologies

Often a network combines several topologies as subnetworks linked together in a larger topology. For instance, one department of a business may have decided to use a bus topology while another department has a ring. The two can be connected to each other via a central controller in a star topology (see Figure).

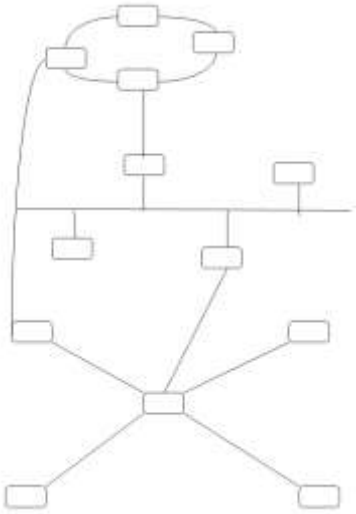


Figure - Hybrid topology.

CATEGORIES OF NETWORKS

Today when we speak of networks, we are generally referring to three primary categories: local area networks, metropolitan area networks, and wide area networks. Into which category a network falls is determined by its size, its ownership, the distance it covers, and its physical architecture .

Local Area Network (LAN)

A local area network (LAN) is usually privately owned and links the devices in a single office building, or campus . Depending on the needs of an organization and the type of technology used.

Metropolitan Area Network (MAN)

A metropolitan area network (MAN) is designed to extend over an entire city. It may be a single network such as a cable television network, or it may be a means of connecting a number of LANs into a larger network so that resources may be shared LAN-to LAN as well as device-to-device. For example, a company can use a MAN to connect the LANs in all of its offices throughout a city .

Wide Area Network (WAN)

A wide area network (WAN) provides long-distance transmission of data, voice, image, and video information over large geographical areas that may comprise a coin try, a continent, or even the whole world (see Figure 2.18). In contrast to LANS (which depend on their own hardware for transmission). WANs may utilize public, leased, or private communication devices. usually in combinations, and can therefore span an unlimited number of miles.

INTERNETWORKS

When two or more networks are connected, they become an internetwork, or internet. Individual networks are joined into internetworks by the use of internetworking devices. These devices, which include routers and gateways. The term internet (lowercase i) should not be confused with the Internet (uppercase /). The first is a generic term used to mean an interconnection of networks. The second is the name of a specific worldwide network.

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